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INTERAGGLUTINATION EXPERIMENTS WITH VARIOUS STRAINS OF SPOROTHRIX.*

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Rabbits were immunized by injections of various strains of sporothrix for a period of about eight months. The animals were given at weekly intervals one slant culture which had been allowed to grow at room temperature for two weeks. The living organisms were used, at first given subcutaneously, later intraperitoneally. The animals suffered somewhat from local subcutaneous abscesses which formed at the site of injection but which never extended, and emaciation became marked in some. In the peritoneal cavity, as shown by postmortem examination, nodular masses formed on the peritoneum and about the intestines and other viscera. Involvement of the organs did not occur. The agglutinins appeared to develop slowly in the animals and tests made at the end of two months showed definite agglutination in dilutions of about 1:40 or slightly higher.

Five strains of sporothrix (A, B, C, D, and E) were used. Sporothrix A was isolated in 1909 from a typical human case which has been reported by Hyde and Davis.¹

Sporothrix B was obtained by Dr. Gougerot of Paris and may be considered a typical strain of the organism as it has been observed in France and commonly called *Sporothrix Beurmanni*.

Sporothrix C was obtained by Dr. Hektoen and was isolated in 1898 from a case of typical sporotrichosis. This case was reported by Hektoen and Perkins² under the title "Refractory Subcutaneous Abscesses Caused by *Sporothrix Schenckii*."

Sporothrix D and E were obtained by Dr. K. F. Meyer of Philadelphia and were isolated from lesions on horses suffering from lymphangitis. Strain E was received too late for immunizing any rabbits.

* Received for publication January 13, 1913.

¹ *Jour. Cutan. Dis.*, 1910, 28, p. 321.

² *Jour. Exper. Med.*, 1900, 5, p. 77.

These organisms are all very similar in their cultural, morphological, and pathogenic properties. French writers, especially Beurmann and Gougerot, have contended that *Sporothrix C* (*Sporothrix Schenckii*) differs sufficiently culturally and morphologically from other strains to justify a different name. This matter has been discussed at length by Gougerot¹ and need not be considered in detail here.

Serum was obtained from the various immune rabbits and interagglutination tests were made with the different strains and with normal rabbit serum for controls. The organisms were allowed to grow about 10 days on glucose agar and the growth was then suspended in salt solution. As a rule a pure homogeneous suspension of spores was thus obtained. Appreciable amounts of mycelial filaments were easily removed by filtering. On account of the satisfactory suspensions thus easily obtained and the large size of the elements the agglutination reactions are very readily observed and determined with definiteness. Both the macroscopic and microscopic methods were used. The latter is undoubtedly distinctly more sensitive than the former inasmuch as in practically

TABLE 1.
AGGLUTINATION OF SPOROTHRIX A.

Immune Sera	Dilutions of Serum							
	1:20	1:40	1:80	1:160	1:320	1:640	1:1,280	1:2,560
Serum A.....	+++	++	++	++	+	+	o	o
Serum B.....	++	++	++	+	+	o	o	o
Serum C.....	+++	++	+	+	o	o	o	o
Serum D.....	+++	++	++	+	o	o	o	o
Normal serum.....	o	o	o	o	o	o	o	o

TABLE 2.
AGGLUTINATION OF SPOROTHRIX B.

Immune Sera	Dilutions of Serum							
	1:20	1:40	1:80	1:160	1:320	1:640	1:1,280	1:2,560
Serum A.....	+++	++	+++	+	o	o	o	o
Serum B.....	++	++	+++	++	+	+	o	o
Serum C.....	+++	++++	++	++	+	+	o	o
Serum D.....	+++	+++	++	++	+	+	o	o
Normal serum.....	o	o	o	o	o	o	o	o

¹ Kolle and Wassermann, *Handbuch der path. Microorg.*, Zweite Auflage, 1912, 5, p. 211.

TABLE 3.
AGGLUTINATION OF SPOROTHRIX C.

Immune Sera	Dilutions of Serum							
	1:20	1:40	1:80	1:160	1:320	1:640	1:1,280	1:2,560
Serum A.....	+++	++	++	+	++	o	o	o
Serum B.....	+++	++	+	+	o	o	o	o
Serum C.....	+++	++	+	+	o	o	o	o
Serum D.....	+++	++	+	o	o	o	o	o
Normal serum.....	o	o	o	o	o	o	o	o

TABLE 4.
AGGLUTINATION OF SPOROTHRIX D.

Immune Sera	Dilutions of Serum							
	1:20	1:40	1:80	1:160	1:320	1:640	1:1,280	1:2,560
Serum A.....	+++	+++	++	+	+	o	o	o
Serum B.....	+++	+++	+++	+++	+	+	o	o
Serum C.....	+++	+++	+++	+++	+	+	o	o
Serum D.....	++	++	++	++	+	+	+	o
Normal serum.....	+	+	o	o	o	o	o	o
	(trace)	(trace)						

TABLE 5.
AGGLUTINATION OF SPOROTHRIX E.

Immune Sera	Dilutions of Serum							
	1:20	1:40	1:80	1:160	1:320	1:640	1:1,280	1:2,560
Serum A.....	+++	++	++	+	+	o	o	o
Serum B.....	+++	+++	+++	+++	+	o	o	o
Serum C.....	+++	+++	+++	+	o	o	o	o
Serum D.....	+++	+++	+++	++	o	o	o	o
Normal serum.....	o	o	o	o	o	o	o	o

all instances the agglutination was observed at higher dilutions. Otherwise no essential deviations were noted between the two methods. The readings given in the tables were made by the microscopic method.

An examination of the tables reveals the fact that there is a striking uniformity in the dilutions at which the different organisms are agglutinated by the various sera. The dilutions at which agglutination ceases vary with little deviation from about 1:320 to 1:640. There is in most instances a slightly higher agglutina-

tion by the sera when the homologous organisms are used but this is not always the case.

CONCLUSION.

Rabbits develop specific agglutinins for various strains of sporothrix. The several strains here tested cannot be differentiated by interagglutination.